VLSI Quantum Computer in Diamond

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Recently, we have been exploring the possibility developing a diamond-based VLSI quantum computer. In analogy to the VLSI quantum computer based on phosphorous in silicon, we will use nuclear spin states of nitrogen-vacancy (NV) color centers in diamond as the qubits, and we will use gate electrodes to tune qubits into and out of resonance with each other and with control fields. However in our design, the qubits will be addressed optically, and it is the optical rather than the spin transitions that will be tuned with the electrodes. I will describe current status of the program and will briefly discuss the potential for room temperature solid-state quantum computers in NV diamond.